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PATENT & TRADEMARK OFFICE

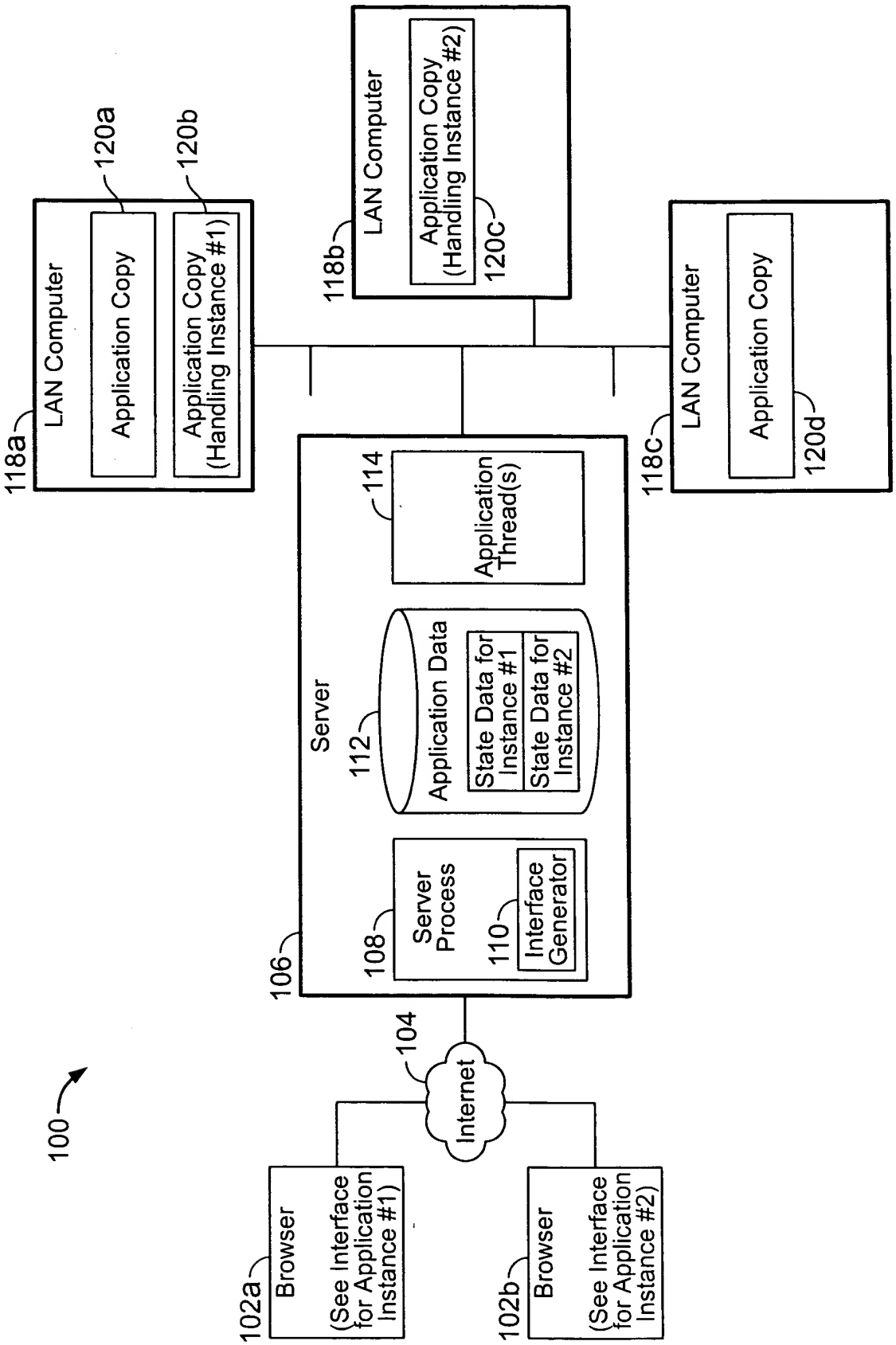

FIG. 1

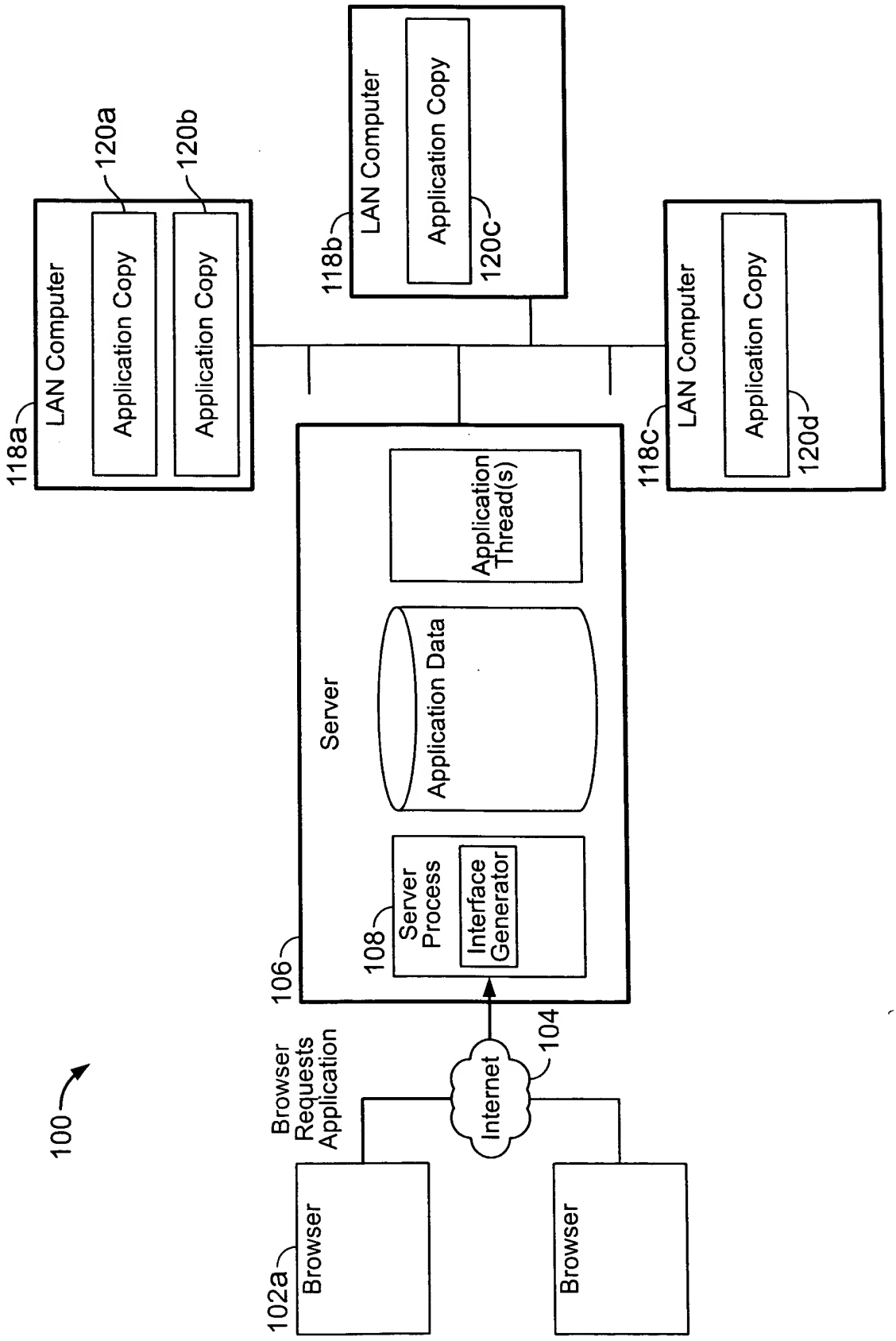
100
Browser Requests Application
Internet
104
102a
Browser
Browser
106
Server
108
Server Process
Interface Generator
Application Data
Application Thread(s)
118a
LAN Computer
Application Copy
120a
Application Copy
120b
118b
LAN Computer
Application Copy
120c
118c
LAN Computer
Application Copy
120d

FIG. 2

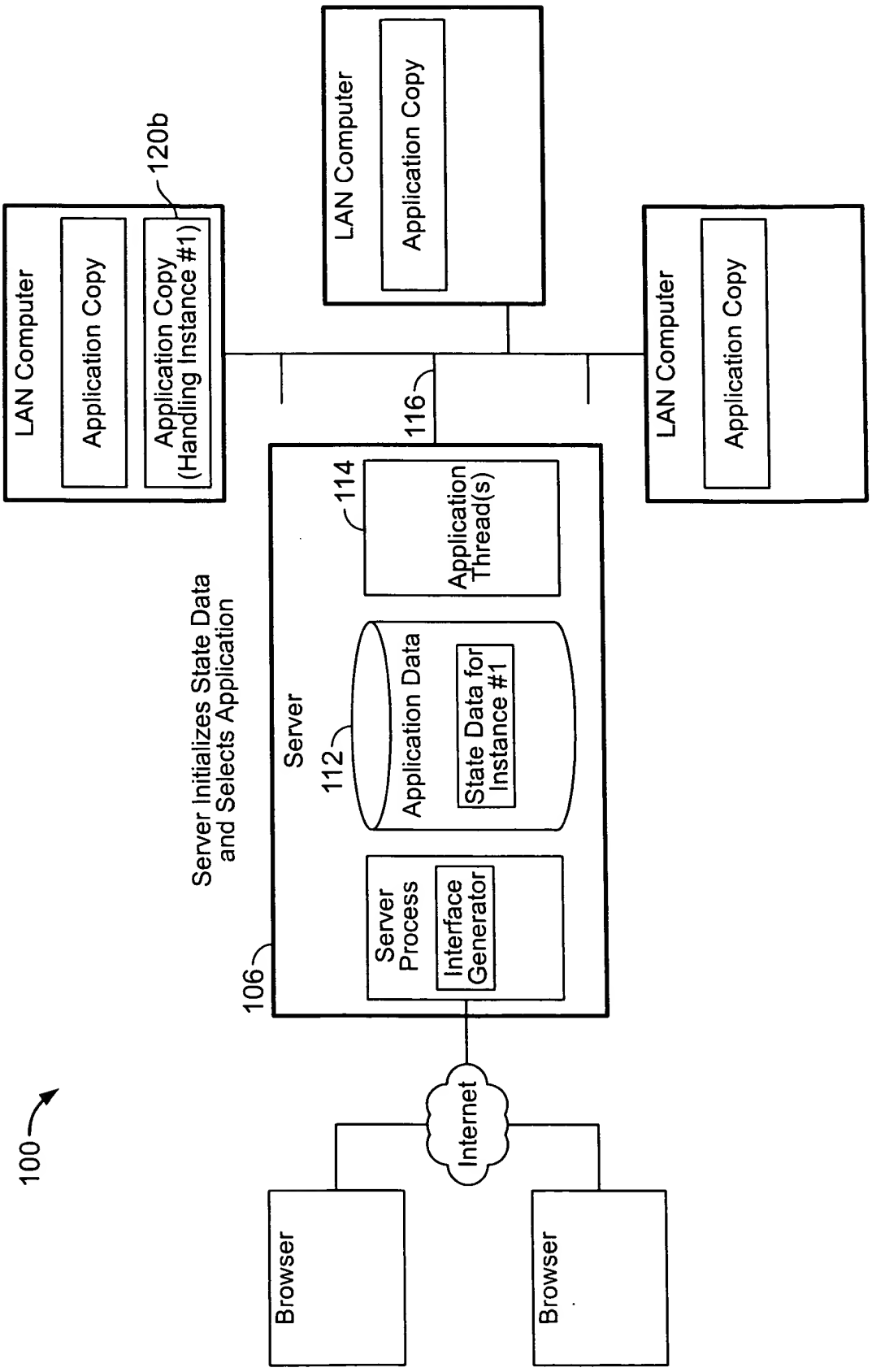
100
Internet
Browser
Browser
Server
106
Server Process
Interface Generator
Application Data
112
State Data for Instance #1
Application Thread(s)
114
Server Initializes State Data and Selects Application
116
LAN Computer
Application Copy
Application Copy (Handling Instance #1)
120b
LAN Computer
Application Copy
LAN Computer
Application Copy

FIG. 3

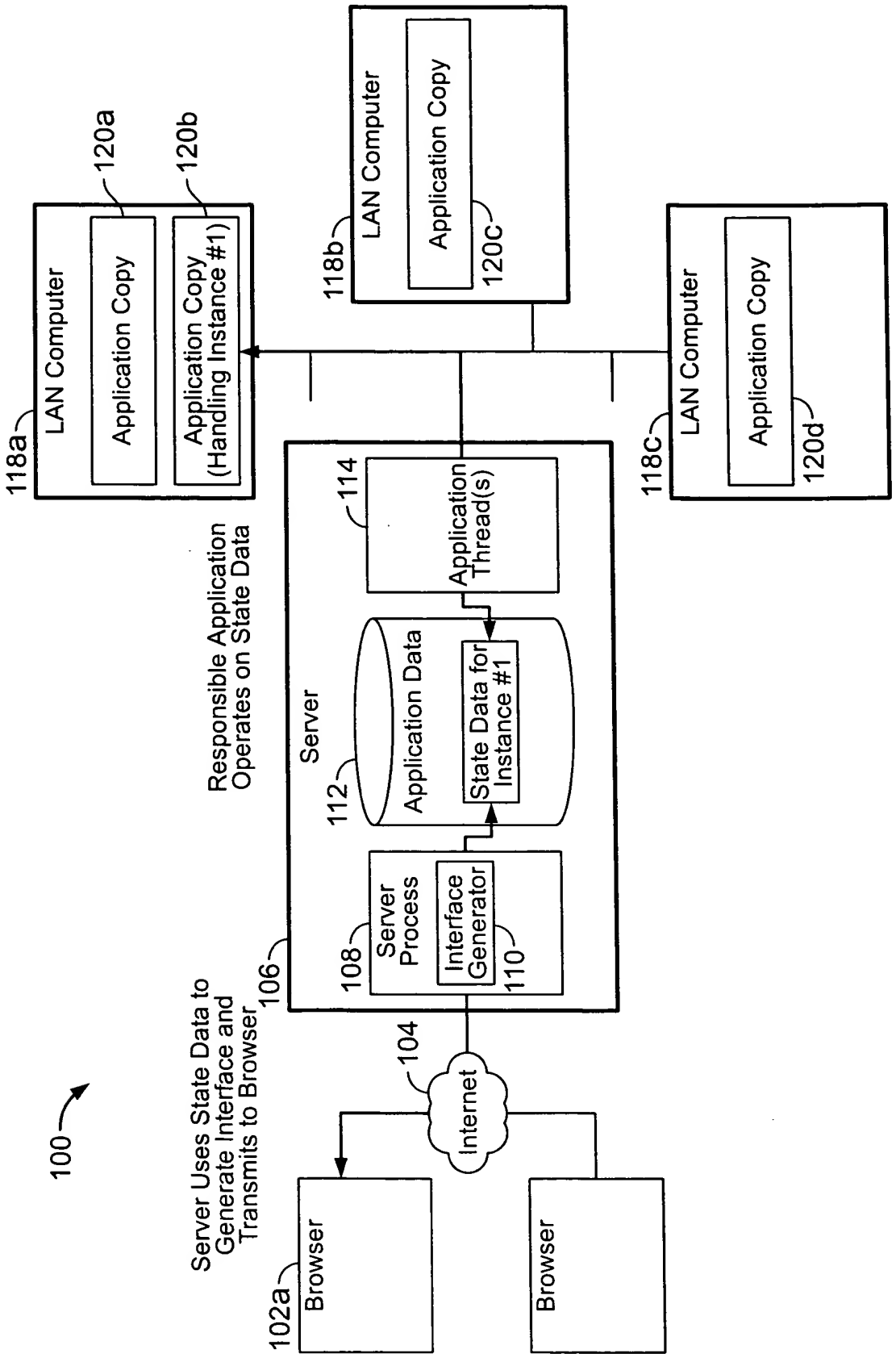
100
Server Uses State Data to Generate Interface and Transmits to Browser
Responsible Application Operates on State Data
Browser
102a
Browser
Internet
104
Server
106
Server Process
108
Interface Generator
110
Application Data
112
State Data for Instance #1
Application Thread(s)
114
LAN Computer
118a
Application Copy
120a
Application Copy (Handling Instance #1)
120b
LAN Computer
118b
Application Copy
120c
LAN Computer
118c
Application Copy
120d

FIG. 4

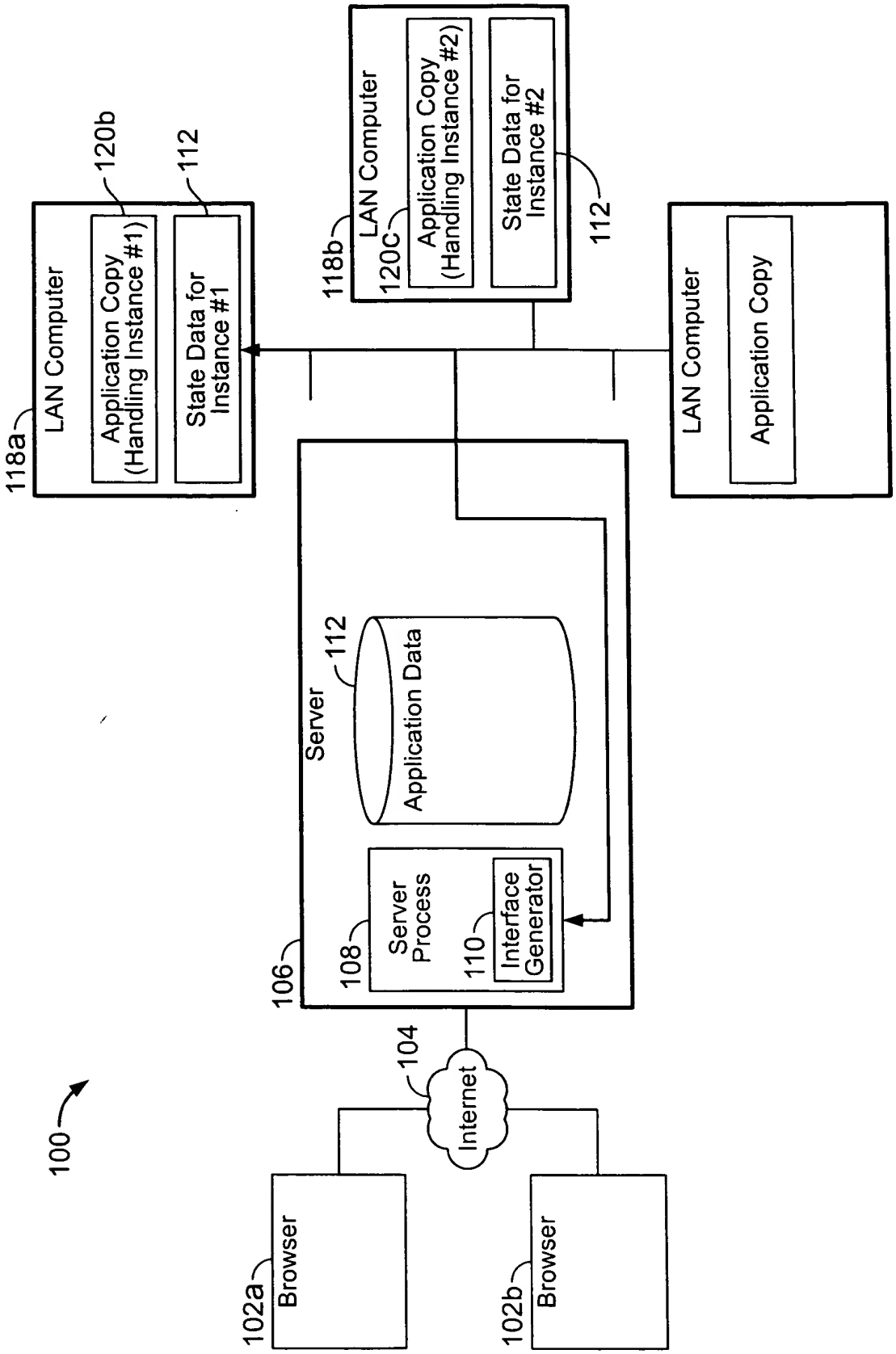
100
Internet
104
Server
106
Server Process
108
Interface Generator
110
Application Data
112
LAN Computer
118a
Application Copy (Handling Instance #1)
120b
State Data for Instance #1
112
LAN Computer
118b
Application Copy (Handling Instance #2)
120c
State Data for Instance #2
112
LAN Computer
Application Copy
Browser
102a
Browser
102b

FIG. 5

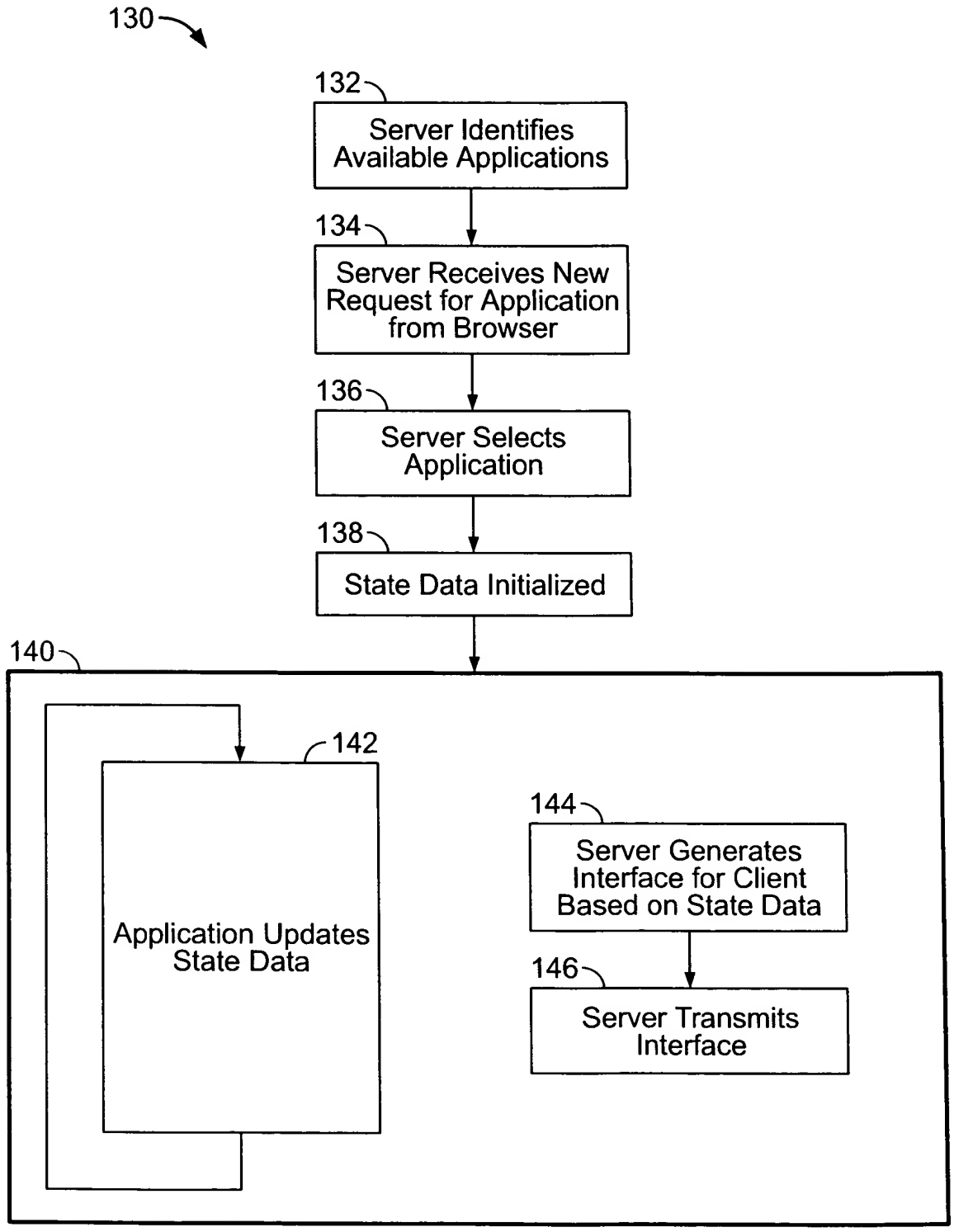
130
132
Server Identifies Available Applications
134
Server Receives New Request for Application from Browser
136
Server Selects Application
138
State Data Initialized
140
142
Application Updates State Data
144
Server Generates Interface for Client Based on State Data
146
Server Transmits Interface

FIG. 6

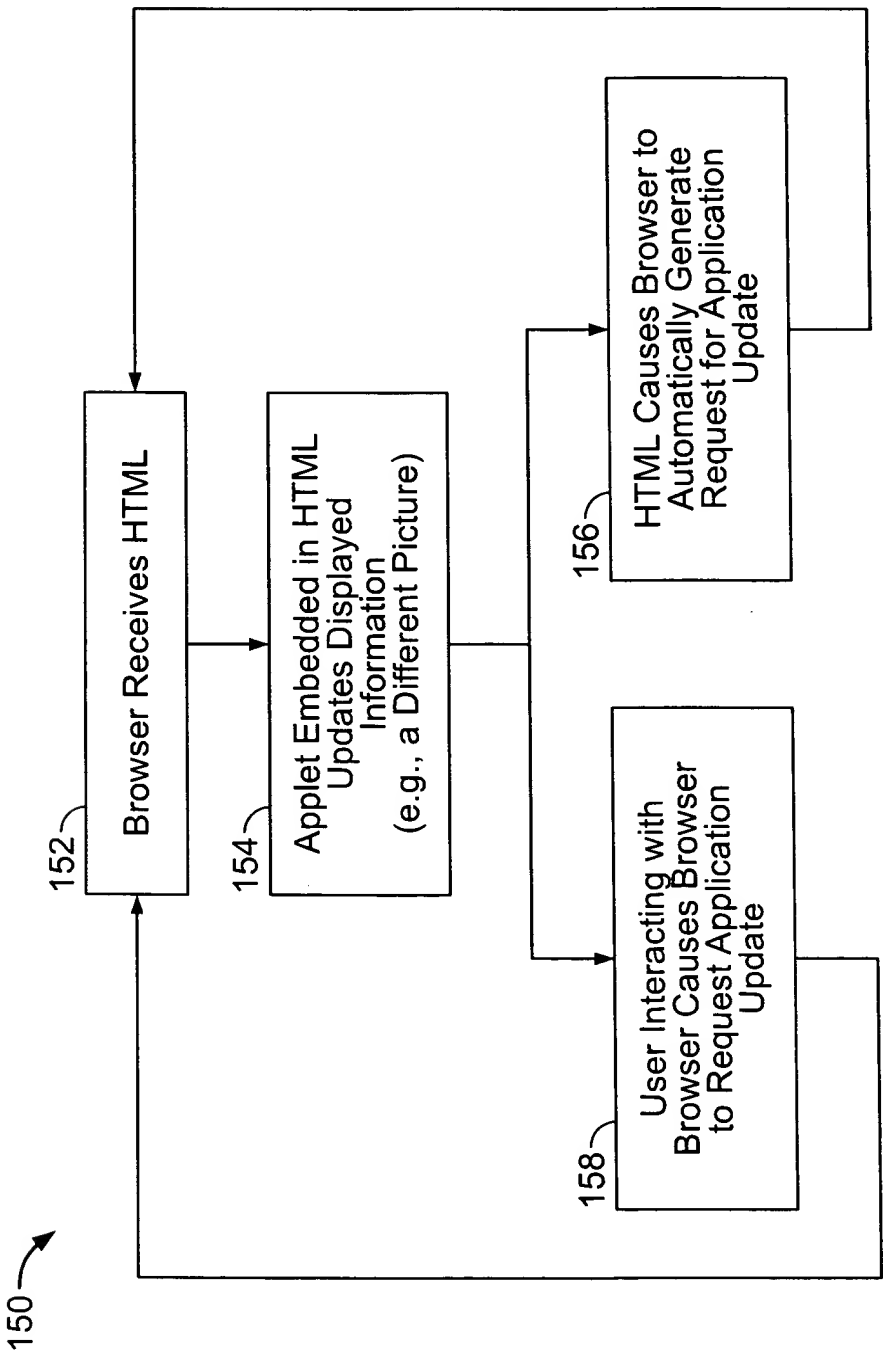
150
152
Browser Receives HTML
154
Applet Embedded in HTML Updates Displayed Information (e.g., a Different Picture)
156
HTML Causes Browser to Automatically Generate Request for Application Update
158
User Interacting with Browser Causes Browser to Request Application Update

FIG. 7

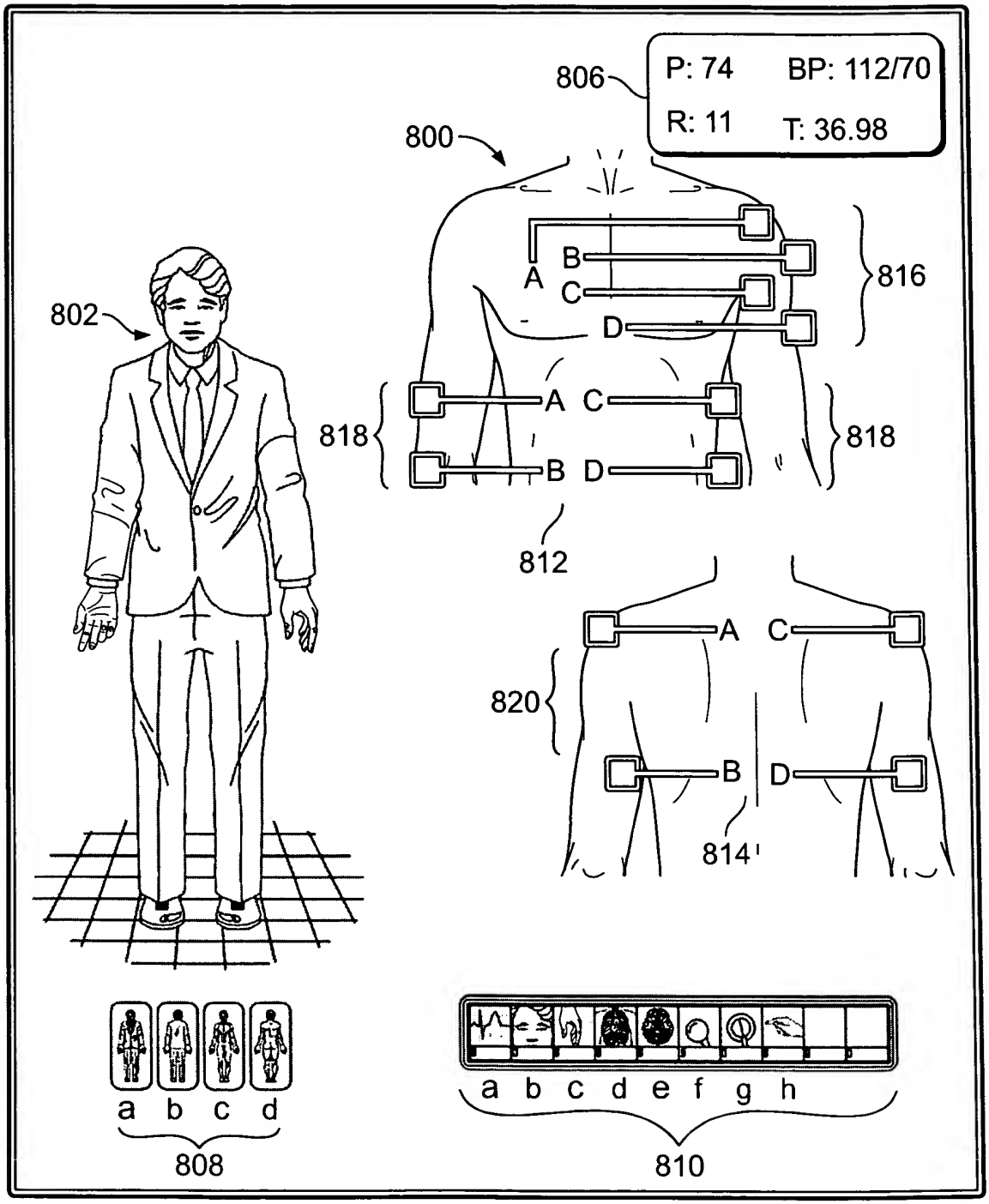
806
P: 74
BP: 112/70
R: 11
T: 36.98
800
802
A
B
C
D
816
818
818
812
820
814'
a b c d
808
a b c d e f g h
810

FIG. 8

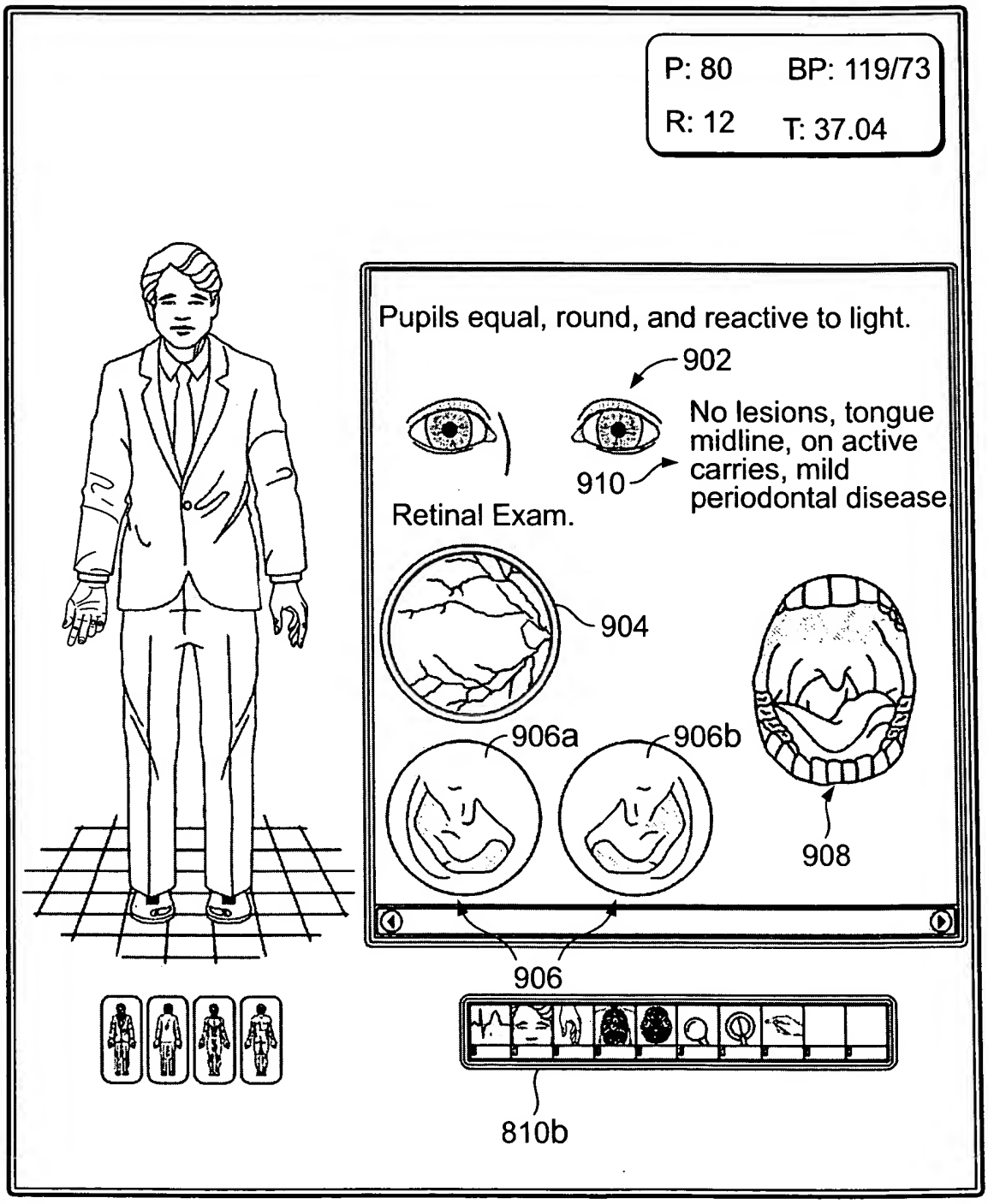
P: 80
BP: 119/73
R: 12
T: 37.04
Pupils equal, round, and reactive to light.
902
No lesions, tongue midline, on active carries, mild periodontal disease
910
Retinal Exam.
904
906a
906b
908
906
810b

FIG. 9

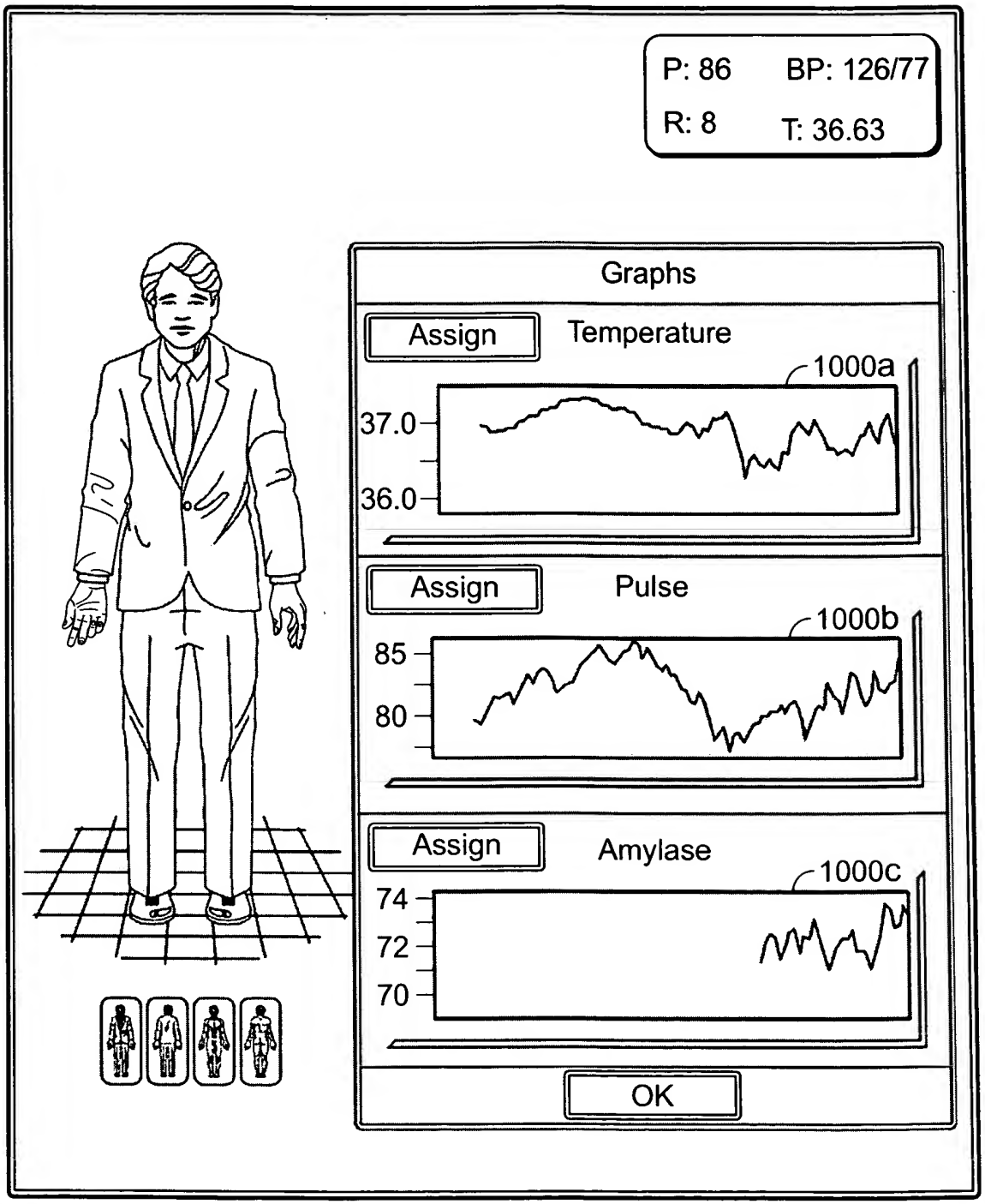
P: 86
BP: 126/77
R: 8
T: 36.63
Graphs
Assign
Temperature
1000a
37.0
36.0
Assign
Pulse
1000b
85
80
Assign
Amylase
1000c
74
72
70
OK

FIG. 10

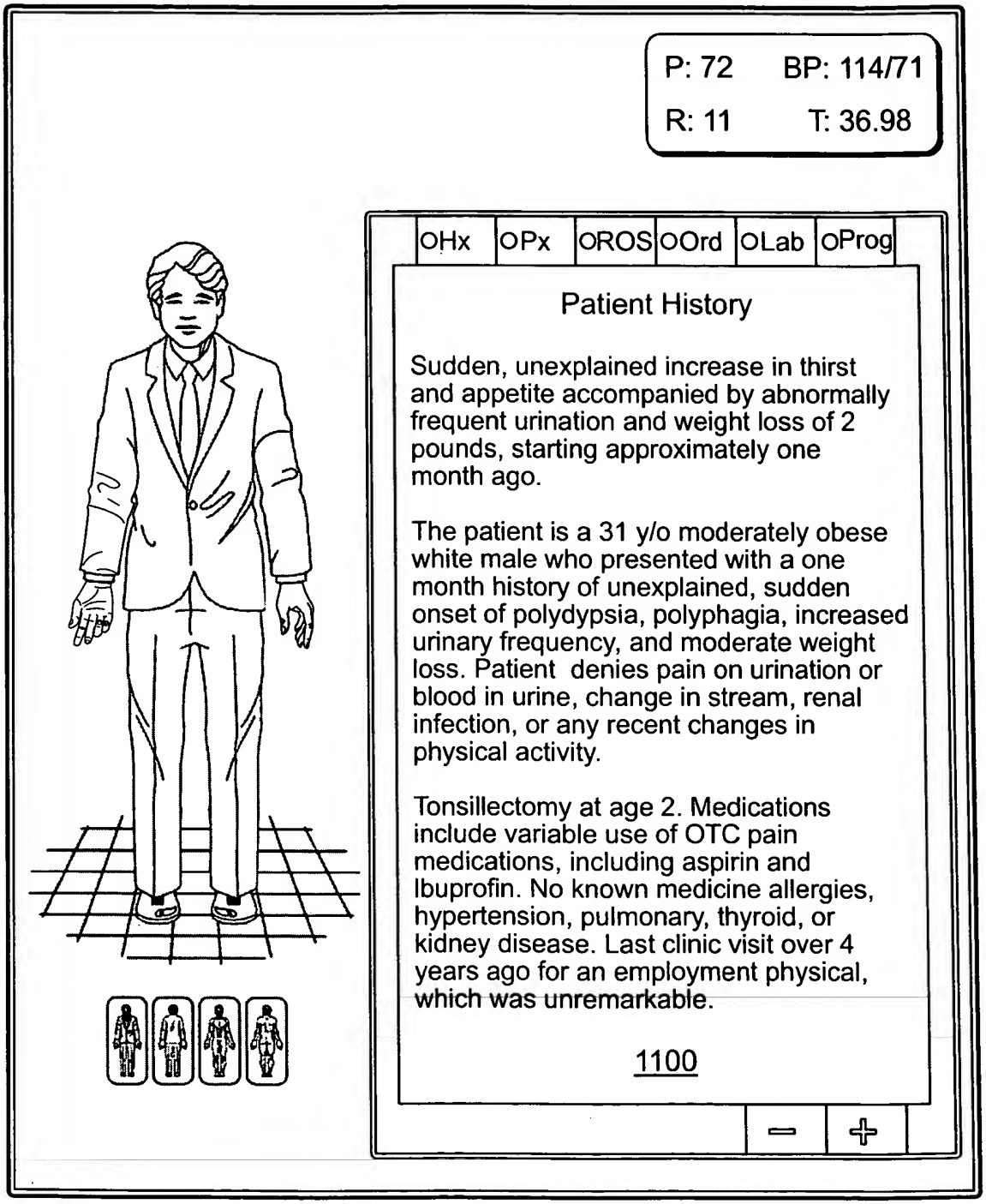
P: 72
BP: 114/71
R: 11
T: 36.98
OHx
OPx
OROS
OOrd
OLab
OProg
Patient History
Sudden, unexplained increase in thirst and appetite accompanied by abnormally frequent urination and weight loss of 2 pounds, starting approximately one month ago.
The patient is a 31 y/o moderately obese white male who presented with a one month history of unexplained, sudden onset of polydypsia, polyphagia, increased urinary frequency, and moderate weight loss. Patient denies pain on urination or blood in urine, change in stream, renal infection, or any recent changes in physical activity.
Tonsillectomy at age 2. Medications include variable use of OTC pain medications, including aspirin and Ibuprofin. No known medicine allergies, hypertension, pulmonary, thyroid, or kidney disease. Last clinic visit over 4 years ago for an employment physical, which was unremarkable.
1100

FIG. 11

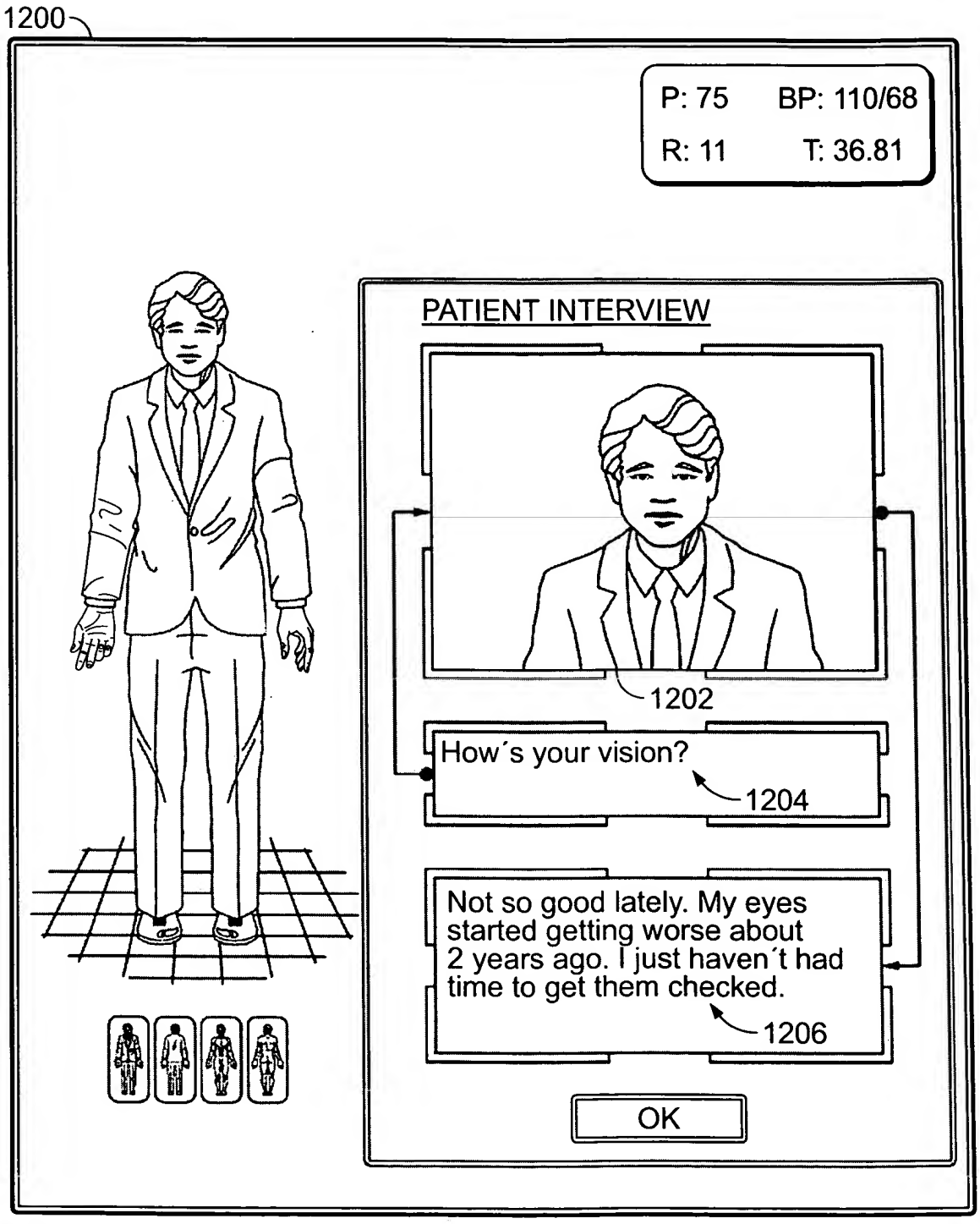
1200
P: 75
BP: 110/68
R: 11
T: 36.81
PATIENT INTERVIEW
1202
How´s your vision?
1204
Not so good lately. My eyes started getting worse about 2 years ago. I just haven´t had time to get them checked.
1206
OK

FIG. 12

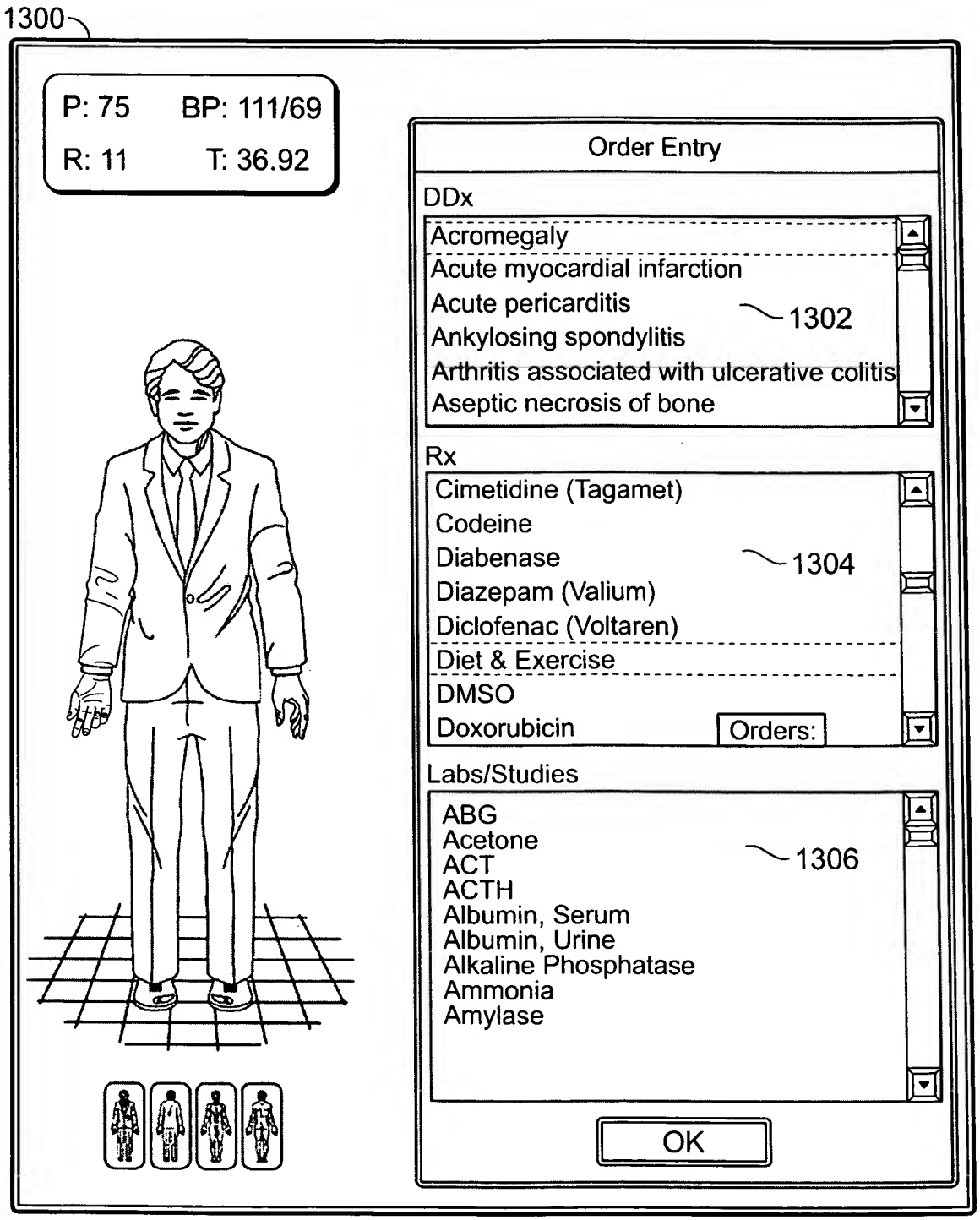
1300
P: 75
BP: 111/69
R: 11
T: 36.92
Order Entry
DDx
Acromegaly
Acute myocardial infarction
Acute pericarditis
Ankylosing spondylitis
Arthritis associated with ulcerative colitis
Aseptic necrosis of bone
1302
Rx
Cimetidine (Tagamet)
Codeine
Diabenase
Diazepam (Valium)
Diclofenac (Voltaren)
Diet & Exercise
DMSO
Doxorubicin
1304
Orders:
Labs/Studies
ABG
Acetone
ACT
ACTH
Albumin, Serum
Albumin, Urine
Alkaline Phosphatase
Ammonia
Amylase
1306
OK

FIG. 13

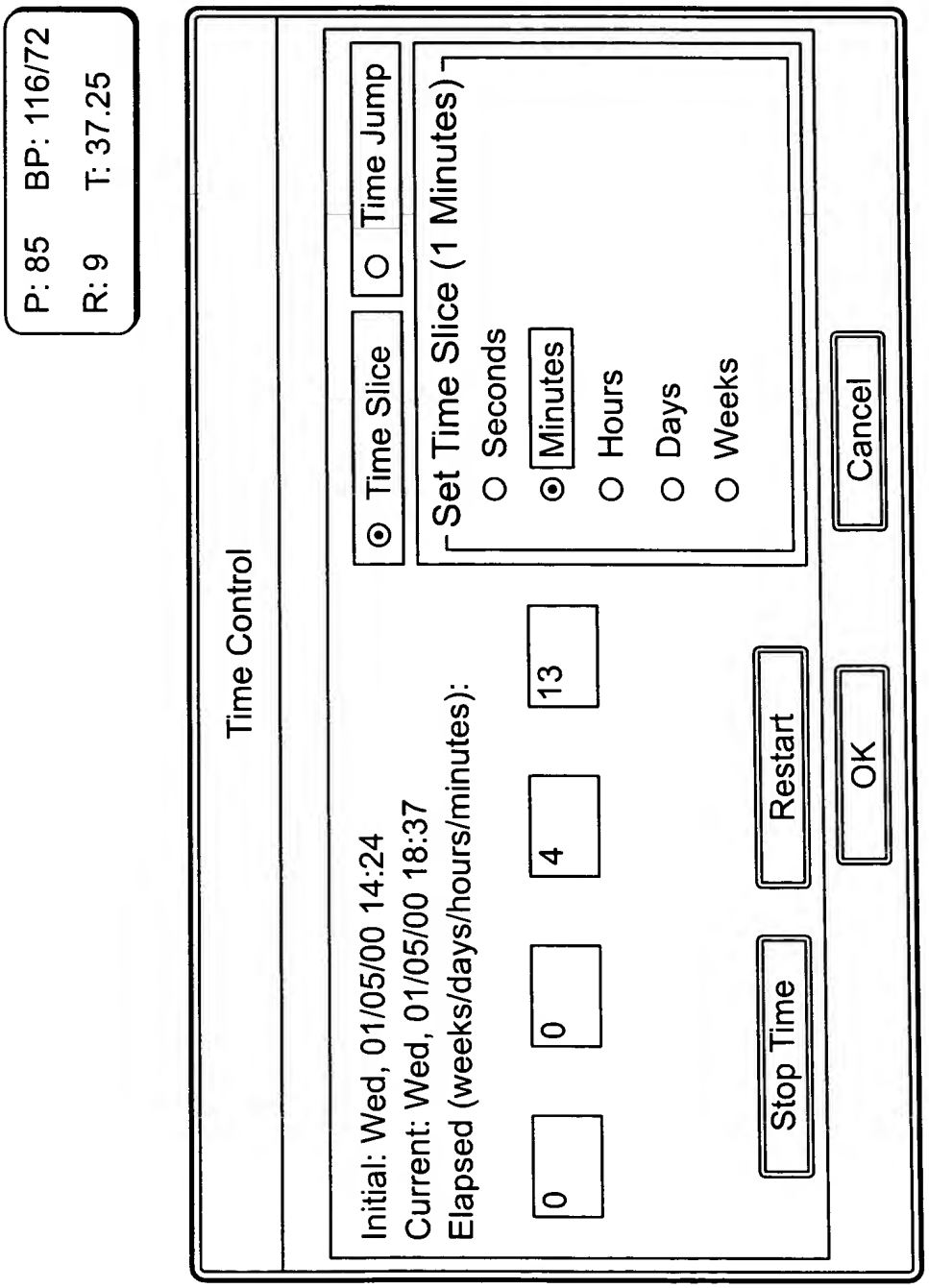
P: 85 BP: 116/72
R: 9 T: 37.25
Time Control
Time Slice
Time Jump
Initial: Wed, 01/05/00 14:24
Current: Wed, 01/05/00 18:37
Elapsed (weeks/days/hours/minutes):
0
0
4
13
Set Time Slice (1 Minutes)
Seconds
Minutes
Hours
Days
Weeks
Stop Time
Restart
OK
Cancel

FIG. 14

1502
Object Model Key ''Patient Views''
Object Model MMFile1 ''Body Renderings\MorphMan\aprime.jpg''
Object Model MMFile2 ''Body Renderings\MorphMan\bprime.jpg''
Object Model MMFile3 ''Body Renderings\MorphMan\cprime.jpg''
Object Model MMFile4 ''Body Renderings\MorphMan\dprime.jpg''

1504
Object Model Key ''ROS Head''
Object Model MMFile1 ''Body Renderings\MFaces\Neutral.jpg''

1506
Object ABD Key ''Front Auscultation''
Object ABD MMFile ''Body Renderings\New_Male_Fat\FatChBkMAus.jpg''
Object ABD Sound1 ''Wav Files\Other\Bowel1.wav''
Object ABD Sound2 ''Wav Files\Other\Bowel2.wav''
Object ABD Sound3 ''Wav Files\Other\Bowel3.wav''
Object ABD Sound4 ''Wav Files\Other\Bowel2.wav''

1508
Object ABD Key ''Front Percussion''
Object ABD MMFile ''Body Renderings\New_Male_Fat\FatChBkMPercuss.jpg''
Object ABD Sound1 ''Wav Files\Percussion\PercusDull.wav''
Object ABD Sound2 ''Wav Files\Percussion\PercusDull.wav''
Object ABD Sound3 ''Wav Files\Percussion\PercusFlat.wav''
Object ABD Sound4 ''Wav Files\Percussion\PercusFlat.wav''
Object ABD Sound5 ''Wav Files\Percussion\PercusResonant.wav''
Object ABD Sound6 ''Wav Files\Percussion\PercusResonant.wav'
Object ABD Sound7 ''Wav Files\Percussion\PercusDull.wav''
Object ABD Sound8 ''Wav Files\Percussion\Exclame.wav'''

FIG. 15A-1

1510
Object Chest Key "Front Auscultation"
Object Chest MMFile "Body Renderings\New_Male_Fat\FatChBkMAus.jpg"
Object Chest Sound1 "Wav Files\Heart Sounds\Normal (A).wav"
Object Chest Sound2 "Wav Files\Heart Sounds\Normal (P).wav"
Object Chest Sound3 "Wav Files\Heart Sounds\Normal (T).wav"
Object Chest Sound4 "Wav Files\Heart Sounds\Normal (M).wav"

1512
Object Chest Key "Back Auscultation"
Object Chest MMFile "Body Renderings\New_Male_Fat\FatChBkMAus.jpg"
Object Chest Sound1 "Wav Files\Breath Sounds\NormBSApex.wav"
Object Chest Sound2 "Wav Files\Breath Sounds\NormBSApex.wav"
Object Chest Sound3 "Wav Files\Breath Sounds\NormBSBase.wav"
Object Chest Sound4 "Wav Files\Breath Sounds\NormBSBase.wav"
Object Chest Sound5 "Wav Files\Breath Sounds\NormBSBase.wav"
Object Chest Sound6 "Wav Files\Breath Sounds\NormBSBase.wav"

1514
Object Chest Key "Back Percussion"
Object Chest MMFile "Body Renderings\New_Male_Fat\ChBkMPercuss.jpg"
Object Chest Sound1 "Wav Files\Percussion\PercusResonant.wav"
Object Chest Sound2 "Wav Files\Percussion\PercusResonant.wav"
Object Chest Sound3 "Wav Files\Percussion\PercusResonant.wav"
Object Chest Sound4 "Wav Files\Percussion\PercusResonant.wav"
Object Chest Sound5 "Wav Files\Percussion\PercusResonant.wav"
Object Chest Sound6 "Wav Files\Percussion\PercusResonant.wav"
Object Chest Sound7 "Wav Files\Percussion\PercusFlat.wav"
Object Chest Sound8 "Wav Files\Percussion\PercusFlat.wav"

FIG. 15A-2

1516
Object CV Key ''EKG''
Object CV MMFile1 ''EKGs\Normsinr.jpg''
Object CV Entry ''Normal sinus rhythm with no signs of past or current cardiac events.''

1518
Object Ext Key ''Extremities - Left Hand''
Object Ext MMFile1 ''Extrem\MNLHand.jpg''
Object Ext Entry ''Left hand normal to inspection.''

1520
Object Ext Key ''Extremities - Right Hand''
Object Ext MMFile1 ''Extrem\MNRHand.jpg''
Object Ext Entry ''Right hand normal to inspection.''

FIG. 15A-3

1522
Object Ext Key ''Extremities - Feet''
Object Ext MMFile1 ''Extrem\MNFeet.jpg''
Object Ext Entry ''Feet normal to inspection.''

1524
Object Heent Key ''Eyes Exam''
Object Heent MMFile1 ''Pupils\NormEyes.jpg''
Object Heent Entry ''Pupils equal, round, and reactive to light.''
Object Heent Description ''Pupils equal, round, and reactive to light.''

1526
Object Heent Key ''Retinal Exam''
Object Heent MMFile1 ''Eye Exam\MorphRetSmall\a.jpg''
Object Heent Entry ''Normal retinal exam.''
Object Heent Description ''Retinal Exam.''

1528
Object Heent Key ''Tympanic Membranes''
Object Heent MMFile1 ''Ear Exam\NormalEarBi.jpg''
Object Heent Entry ''Tympanic membranes intact, no signs of fluid bilaterally.''
Object Heent Description ''''

1530
Object Heent Key ''Throat Exam''
Object Heent MMFile1 ''Throat\M_Throat_hu.jpg''
Object Heent Entry ''Throat is free of lesions''
Object Heent Description ''No lesions, tongue midline, no active carries, mild peridontal disease.''

FIG. 15B-1

1532
- Object Neuro Key ''Speech Pattern''
- Object Neuro MMFile1 ''Wav Files\speech\MspeechN.wav''
- Object Neuro Entry ''Normal speech pattern.''
- Object Neuro Description ''Click button to hear speech''

1534
- Object Neuro Key ''Gait''
- Object Neuro MMFile1 ''Gait\MNGaitC.avi''
- Object Neuro Entry ''Normal gait.''

1536
- Object Rad Key ''Chest Film''
- Object Rad MMFile1 ''CXRs\NormalMale.jpg''
- Object Rad Entry ''Chest film normal. Trachea midline. No interstitial opacities.''

1538
- Object Rad Key ''Skull Film''
- Object Rad MMFile1 ''CXRs\NormalSkull.jpg''
- Object Rad Entry ''Skull film unremarkable. No masses or lesions visualized.''

FIG. 15B-2

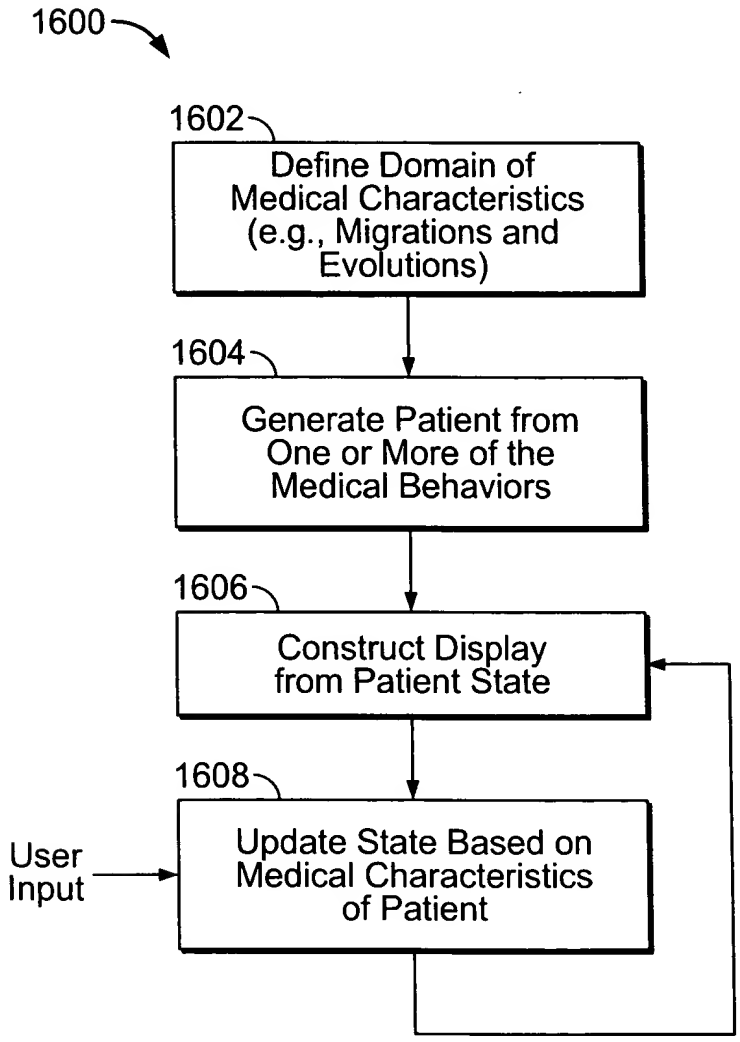
1600
1602
Define Domain of Medical Characteristics (e.g., Migrations and Evolutions)
1604
Generate Patient from One or More of the Medical Behaviors
1606
Construct Display from Patient State
1608
User Input
Update State Based on Medical Characteristics of Patient

FIG. 16

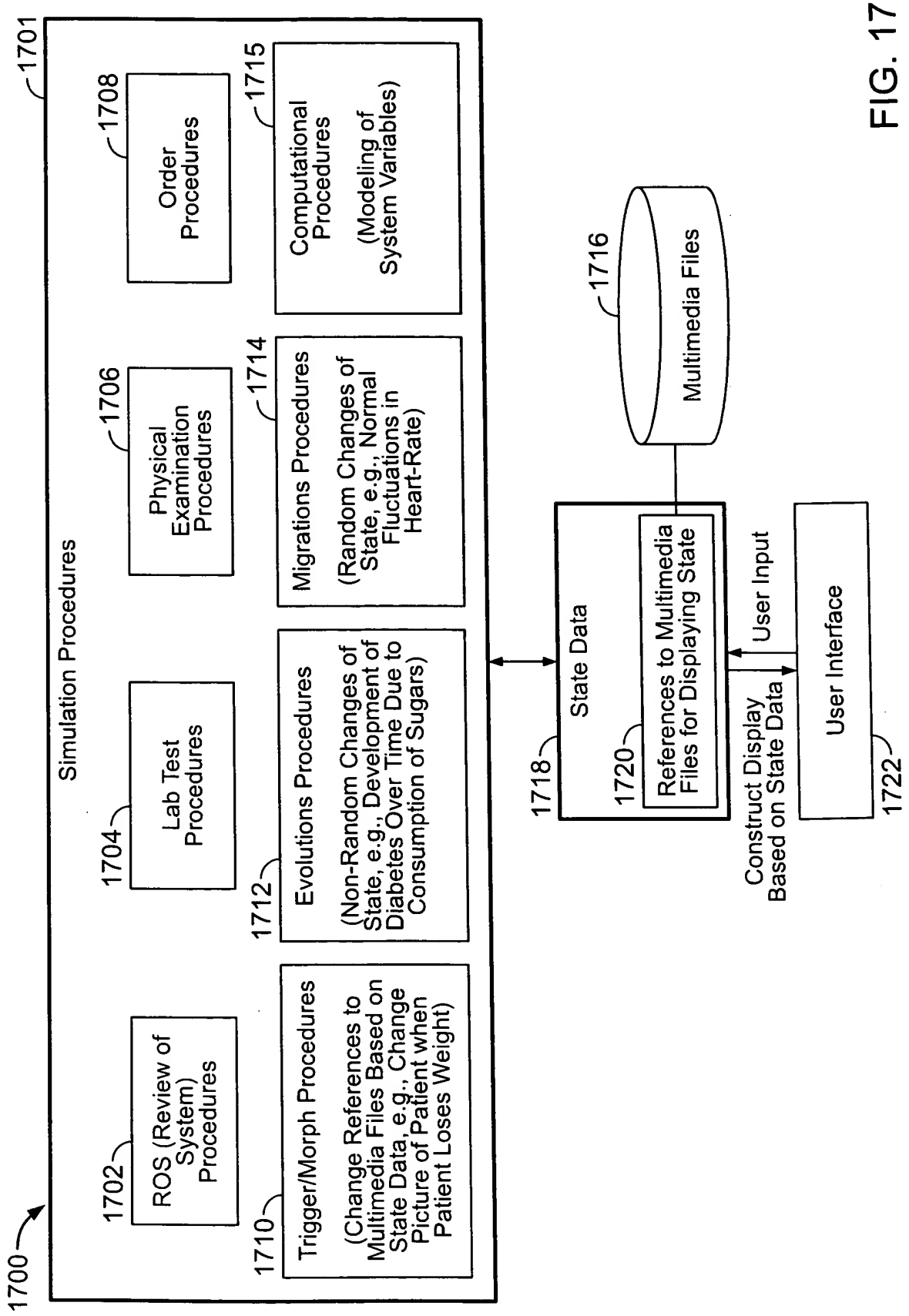
1700
1701
Simulation Procedures
1702
ROS (Review of System) Procedures
1704
Lab Test Procedures
1706
Physical Examination Procedures
1708
Order Procedures
1710
Trigger/Morph Procedures
(Change References to Multimedia Files Based on State Data, e.g., Change Picture of Patient when Patient Loses Weight)
1712
Evolutions Procedures
(Non-Random Changes of State, e.g., Development of Diabetes Over Time Due to Consumption of Sugars)
1714
Migrations Procedures
(Random Changes of State, e.g., Normal Fluctuations in Heart-Rate)
1715
Computational Procedures
(Modeling of System Variables)
1716
Multimedia Files
1718
State Data
1720
References to Multimedia Files for Displaying State
User Input
Construct Display Based on State Data
1722
User Interface

FIG. 17

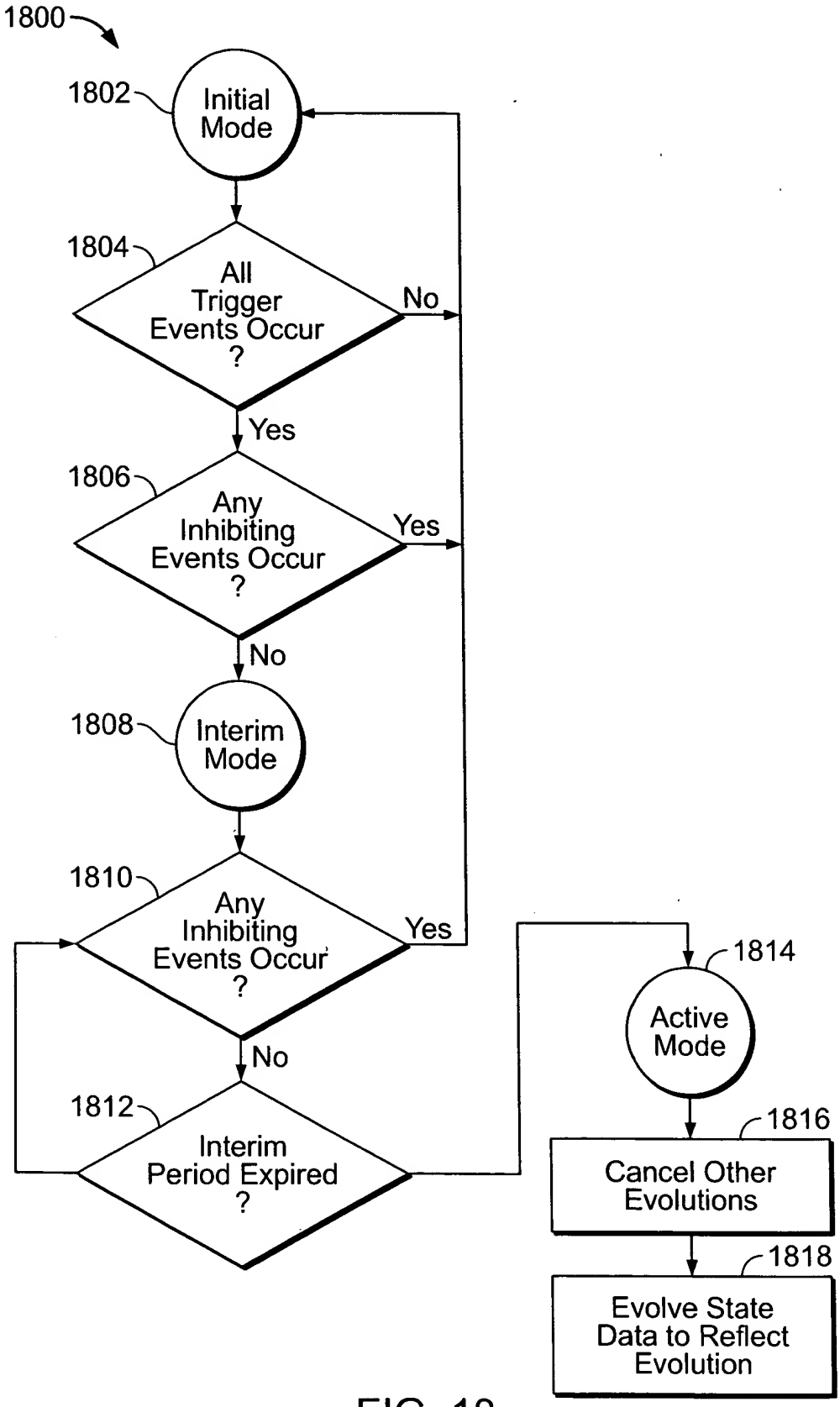
1800
1802
Initial Mode
1804
All Trigger Events Occur ?
No
Yes
1806
Any Inhibiting Events Occur ?
Yes
No
1808
Interim Mode
1810
Any Inhibiting Events Occur ?
Yes
No
1812
Interim Period Expired ?
1814
Active Mode
1816
Cancel Other Evolutions
1818
Evolve State Data to Reflect Evolution

FIG. 18

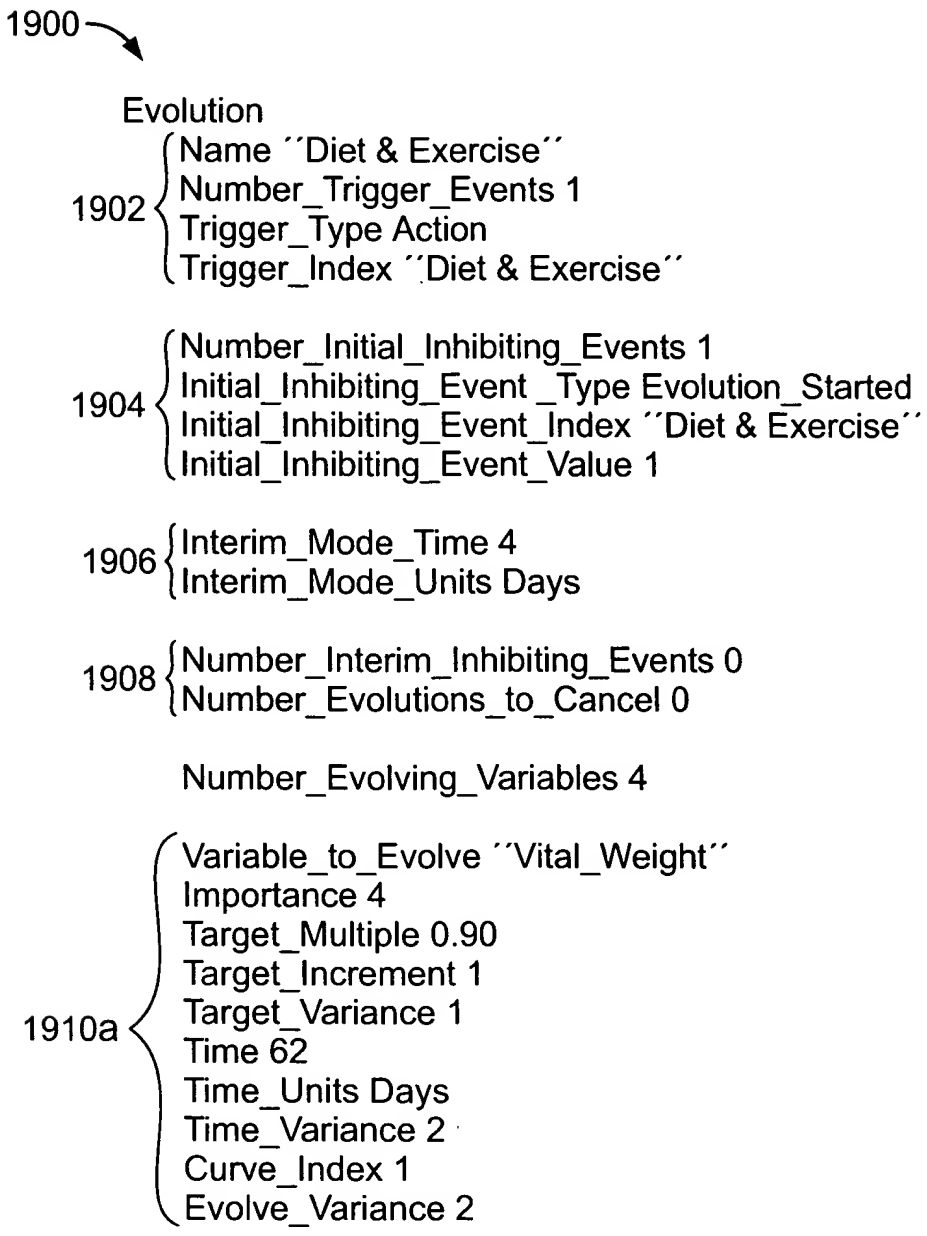
1900
Evolution
1902
Name ''Diet & Exercise''
Number_Trigger_Events 1
Trigger_Type Action
Trigger_Index ''Diet & Exercise''
1904
Number_Initial_Inhibiting_Events 1
Initial_Inhibiting_Event _Type Evolution_Started
Initial_Inhibiting_Event_Index ''Diet & Exercise''
Initial_Inhibiting_Event_Value 1
1906
Interim_Mode_Time 4
Interim_Mode_Units Days
1908
Number_Interim_Inhibiting_Events 0
Number_Evolutions_to_Cancel 0
Number_Evolving_Variables 4
1910a
Variable_to_Evolve ''Vital_Weight''
Importance 4
Target_Multiple 0.90
Target_Increment 1
Target_Variance 1
Time 62
Time_Units Days
Time_Variance 2
Curve_Index 1
Evolve_Variance 2

FIG. 19A

1910b
Variable_to_Evolve ''Glucose, Fasting''
Importance 3
Target_Multiple 0.90
Target_Increment 1
Target_Variance 1.5
Time 52
Time_Units Days
Time_Variance 1
Curve_Index 1
Evolve_Variance 1.25

1910c
Variable_to_Evolve ''Glucose, Plasma''
Importance 5
Target_Multiple 0.95
Target_Increment 1
Target_Variance 1.25
Time 42
Time_Units Days
Time_Variance 1
Curve_Index 1
Evolve_Variance 1.45

1910d
Variable_to_Evolve ''Glucose, 2h Postprandial''
Importance 2
Target_Multiple 0.95
Target_Increment 1
Target_Variance 1.25
Time 42
Time_Units Days
Time_Variance 1
Curve_Index 1
Evolve_Variance 1.75

End_Evolution

FIG. 19B

2000

```
Migration
Name          ''ACT''
Comment       ''Activated clotting Time''
Units         ''s''
Variable              ''ACT''
Start         143   }
Min           114   } 2002
Max           186   }
Time_Step             1       }
Time_Unit             Minutes } 2004
Variance              0.4     } 2006
Time_Jump             2
End_Migration
```

FIG. 20

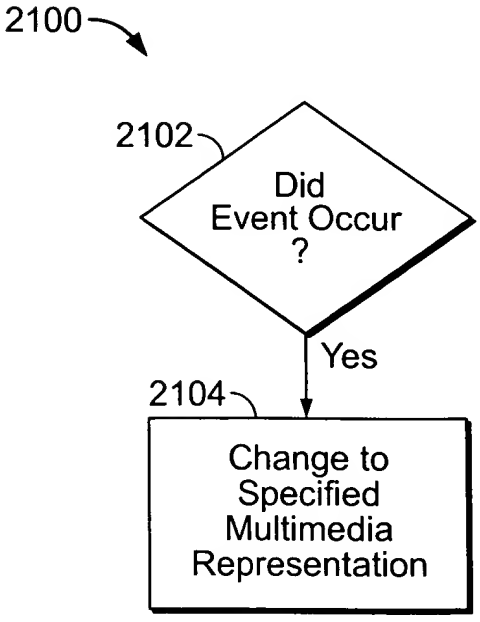

FIG. 21

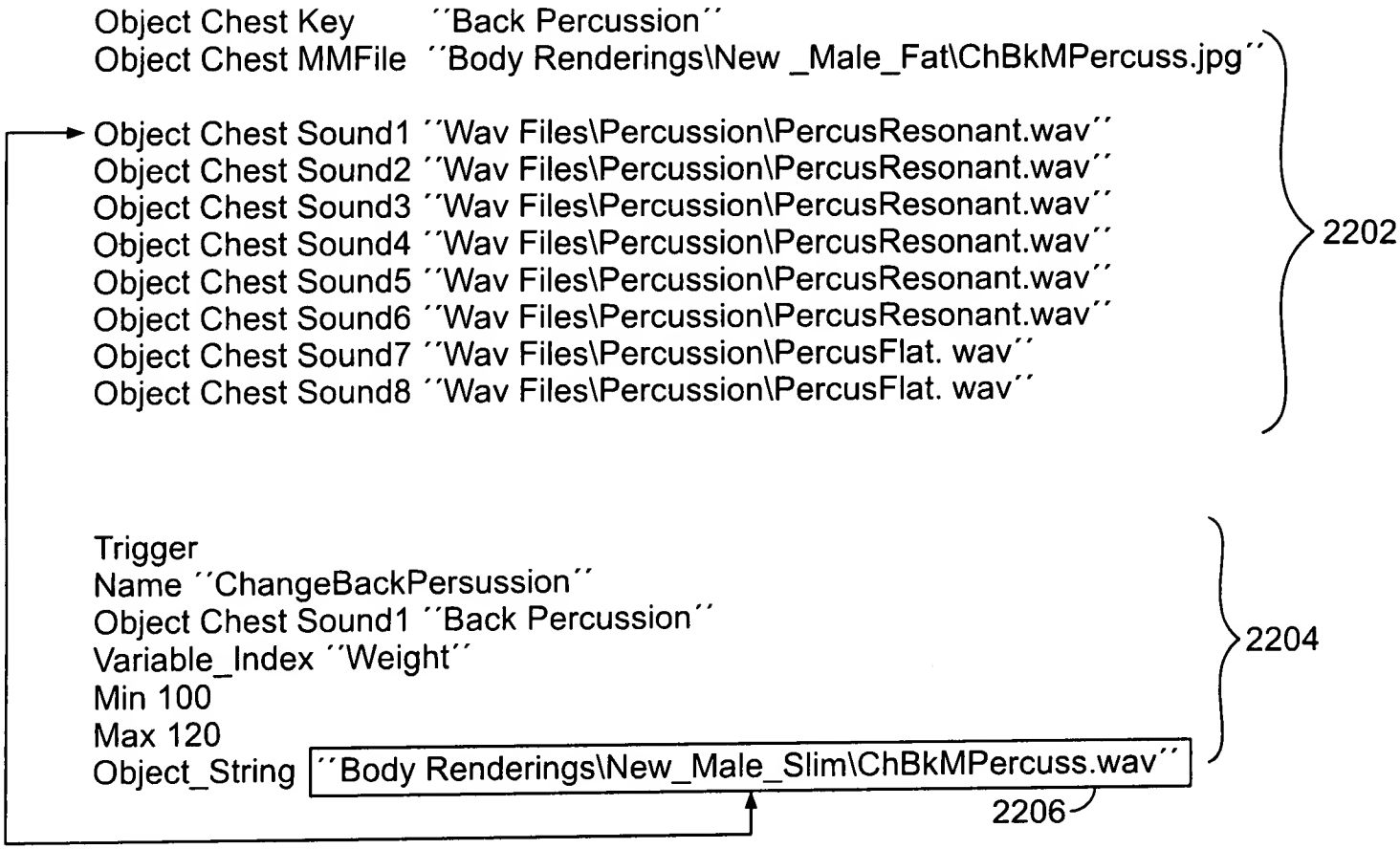
Object Chest Key ''Back Percussion''
Object Chest MMFile ''Body Renderings\New _Male_Fat\ChBkMPercuss.jpg''
Object Chest Sound1 ''Wav Files\Percussion\PercusResonant.wav''
Object Chest Sound2 ''Wav Files\Percussion\PercusResonant.wav''
Object Chest Sound3 ''Wav Files\Percussion\PercusResonant.wav''
Object Chest Sound4 ''Wav Files\Percussion\PercusResonant.wav''
Object Chest Sound5 ''Wav Files\Percussion\PercusResonant.wav''
Object Chest Sound6 ''Wav Files\Percussion\PercusResonant.wav''
Object Chest Sound7 ''Wav Files\Percussion\PercusFlat. wav''
Object Chest Sound8 ''Wav Files\Percussion\PercusFlat. wav''
2202
Trigger
Name ''ChangeBackPersussion''
Object Chest Sound1 ''Back Percussion''
Variable_Index ''Weight''
Min 100
Max 120
Object_String ''Body Renderings\New_Male_Slim\ChBkMPercuss.wav''
2204
2206

FIG. 22

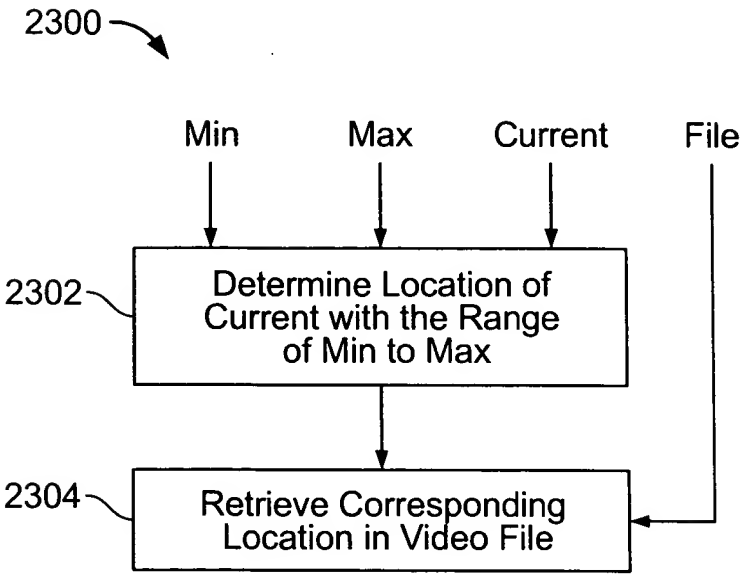

FIG. 23

```
Morph
Name  ''vital_weightM''
Comment   ''No Comment''
Variable      ''vital_weight''
Min   164.0
Max   184.0
End_Morph
```

FIG. 24

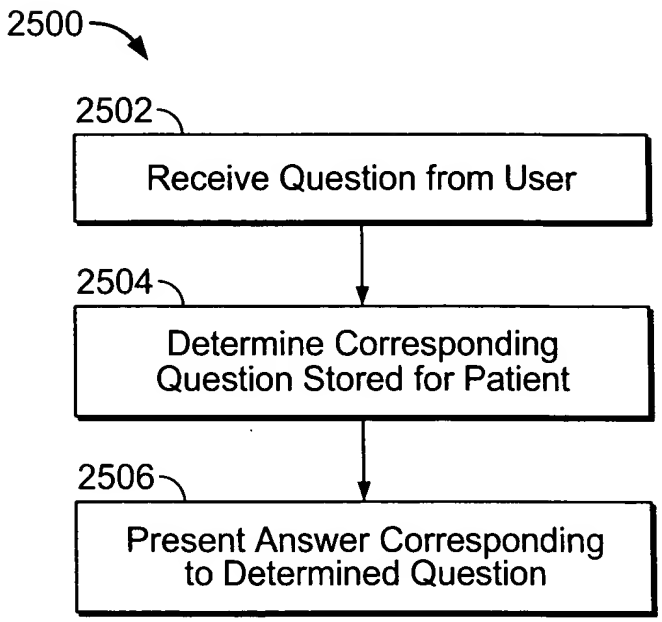

FIG. 25

Object ROS Question ''Have you felt fatigued?''
Object ROS Answer ''Well, I do find myself more tired at the end of the day lately, even though my job hasn't changed in years.''
Object ROS Keywords ''tire, fatigue, letharg''
Object ROS Entry ''Fatigued at the end of the day.''
Object ROS MMFile1 ''Body Renderings\FFaces\sullen.jpg''

FIG. 26

```
Object Lab Test ''Acetone''
Object Lab Description ''No migration - Neg/Pos''
Object Lab Entry ''Neg/Pos''
```

FIG. 27

```
Object Order Action ''Acarbose''
Object Order Description ''Oral Antidiabetic - Precose''
Object Order Entry ''Given to patient PO; tolerated well''
```

FIG. 28

```
Object Physical Key ''Oral Temperature''
Object Physical Text ''Oral Temperature:  $temperature$''
```

FIG. 29

```
COMPUTATION
Name            ''Vital_BP_Diastolic''
Comment         ''no comment''
Units           '' mmHG''
Variable        ''Vital_BP_Diastolic''
Method_Name''ComputeBPDiastolic''
Number_Arguments  1
Argument_Variable ''Vital_BP_Systolic''
Variance        2
End_Computation
```

FIG. 30

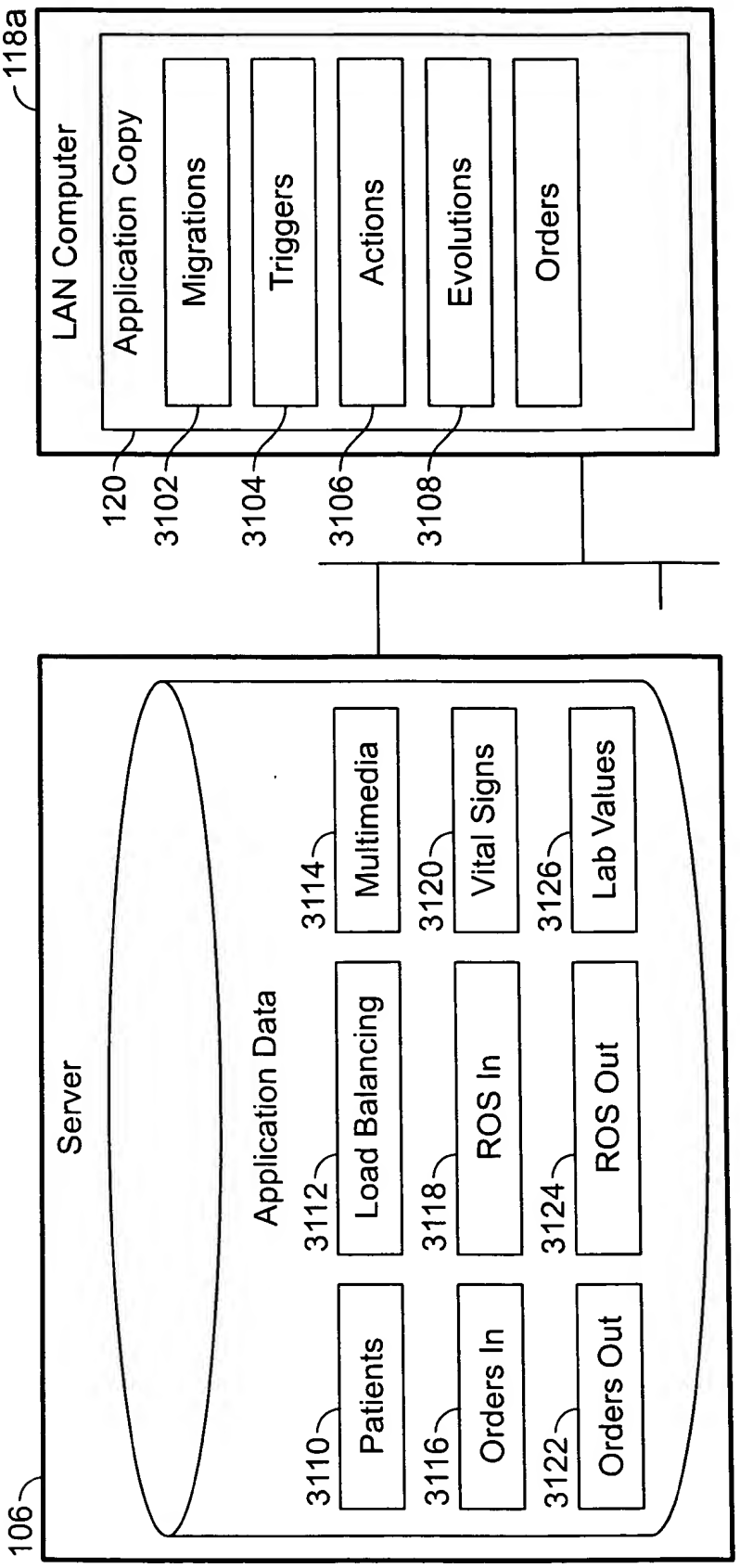
118a
LAN Computer
Application Copy
Migrations
Triggers
Actions
Evolutions
Orders
120
3102
3104
3106
3108
106
Server
Application Data
3110
Patients
3112
Load Balancing
3114
Multimedia
3116
Orders In
3118
ROS In
3120
Vital Signs
3122
Orders Out
3124
ROS Out
3126
Lab Values

FIG. 31